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Diseases, Insects, Pests

Alberta AGRICULTURE

Agdex 663-15

Revised May, 1992

Johne's Disease

Introduction

Johne's disease (paratuberculosis) is a chronic, debilitating disease that affects the intestines of all ruminant animals, including cattle, sheep and goats. Although many animals in a herd may be infected, usually less than five per cent of infected animals will develop clinical signs of disease. Under circumstances of stress, inadequate nutrition or parasitism, more of the infected animals may develop clinical disease. Once clinical disease develops, affected animals eventually die. There is no treatment for Johne's disease.

The true prevalence and economic losses associated with Johne's disease are unknown. This is because there is no practical diagnostic test that reliably detects infections of *Mycobacterium paratuberculosis* in living animals that have not developed clinical disease. Slaughterhouse studies in New Zealand and the United States have identified between four and 18 per cent of cull cows infected with *M. paratuberculosis*. A large study done in the eastern United States and Puerto Rico in 1987 involved 7,540 cattle. In this study, 2.9 per cent of dairy culls and 0.8 per cent of beef culls were found to be infected. No estimates are available for the prevalence of *M. paratuberculosis* infection in Alberta cattle, although many herds likely are infected unknowingly. It is unknown if economic losses are significant in these herds.

The most significant economic losses associated with Johne's disease are decreased milk production and reduced salvage value of clinically affected animals. Milk production from dairy cows affected with Johne's disease has been estimated to drop 7.8 per cent in their last lactation and the slaughter weight of these animals was 59 kg less.

Cause

This disease is caused by *Mycobacterium paratuberculosis* which is closely related to the organisms that cause tuberculosis and leprosy. This organism does not cause disease in non-ruminant animals. Infection with *M. paratuberculosis* is usually acquired by consuming feed and water contaminated with manure from infected animals. Fecal shedding from clinically affected animals has been estimated to reach more than 500 billion organisms per day. Obviously, the environment can become very heavily contaminated and most animals on these farms will be exposed to the infection.

Up to 35 per cent of cows with advanced clinical disease have shed *M. paratuberculosis* in their milk. As well, there are reports of calves being born already infected, but this appears to occur only among dams that are shedding very high numbers of the organism.

Mycobacterium paratuberculosis is resistant to environmental degradation, as well as many disinfectants. This organism survives in stagnant water, manure or deep soil for up to a year. It also withstands freezing at minus 14°C for up to a year. The ability of this organism to survive in the environment is reduced by the presence of urine or by the ensiling process.

Calves under six months of age are the most susceptible to infection. Depending on the number of organisms the calf is exposed to, only about a third of exposed calves become chronically infected with *M. paratuberculosis*. Clinical signs of disease are seldom observed in animals under two or three years of age. Consequently, this is a disease of adults in which the infection was acquired in the first few months of life.

M. paratuberculosis infects cells that line the intestines but does not damage them. It is also able to resist being killed by the body's immune cells. The signs of clinical disease are caused by the body's immune response to the presence of *M. paratuberculosis*, not by direct damage of the intestinal cells by the organism itself.

Signs of infection

Less than five per cent of infected animals develop clinical signs of illness. The reason for this is unknown. Infected animals without clinical signs act as carrier animals and are a source of infection to the environment on the farm. Clinical signs seldom develop in animals under 2 - 3 years of age. Affected animals may develop intermittent bouts of diarrhea that gradually become more frequent. Other animals suddenly develop diarrhea, which persists until death. Progressive weight loss is typical of this disease and may begin before diarrhea

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develops. Although affected animals appear unthrifty, with a rough hair coat and declining milk production, their appetite remains normal until the terminal stages of the disease.

Weight loss without diarrhea is the main sign of disease in sheep and goats.

Diagnosis

Animals with chronic, non-responsive diarrhea and progressive emaciation, coupled with a normal appetite should be viewed with suspicion. Johne's disease is confirmed by a postmortem examination.

It may be difficult to detect infected animals that do not exhibit clinical signs. Culture of feces for *M. paratuberculosis* is expensive because of the long time required to grow the organism. Cultures must be incubated for up to four months before they can be called negative. Intermittent shedding also makes a negative fecal culture difficult to interpret. Several blood tests are available, but the number of false positives and negatives makes these tests unreliable.

Vaccination

Vaccines have been developed in the United States, Europe and New Zealand. They are effective in reducing the number of clinically affected animals. Unfortunately, vaccination does not reduce the total number of infected animals in the herd.

Reactions at the injection site in animals or in humans injected accidentally are major concerns regarding the use of paratuberculosis vaccines. These vaccines are not available in Canada because they interfere with subsequent tuberculosis tests.

Control

Producers should attempt to maintain a disease free herd by rearing their own heifer replacements. Purchasing replacements is risky because of the lack of a reliable test to detect infected animals that are not showing clinical disease.

Once the disease has been diagnosed in a herd, avoid selling the animals for dairy or breeding purposes. Infected herds have up to 20 times more carrier animals than those showing signs of disease.

Because of the difficulty in detecting carrier animals, eradication of Johne's disease from a herd is unlikely to be successful. Even complete depopulation may be unsuccessful due to the risk of purchasing carrier animals to repopulate the herd. Rigid culling procedures and improved herd management will reduce Johne's disease to acceptable levels.

Recommended management practices for infected herds include the following:

- Cull animals exhibiting signs of clinical disease that suggest of Johne's disease. Have the carcasses examined to confirm the diagnosis.
- Cull all offspring, dams and siblings of confirmed cases.
- Separate unthrifty animals from the herd.
- Clean and disinfect areas where affected animals have been kept. *M. paratuberculosis* is susceptible to ten minutes exposure to five per cent formalin, 1:32 cresylic disinfectant, 1:40 phenol, 1:1000 mercury bichloride and 1:50 calcium hypochloride.
- Remove manure from the barn yard regularly and spread on cultivated land. Avoid spreading manure on pastures.
- Pasture calves on clean pasture and maintain in winter quarters separate from adults until the heifer enters the milking herd. Drain, fill or fence off sloughs.
- Protect young animals from adult manure drainage.
- Ensure feed and water are not contaminated with manure. Drinking water should be piped from clean sources.
- Remove calves from their dams immediately after birth and put them in clean quarters separate from adult animals.
- Clean the udder before drawing colostrum for calf feeding.
- Rear calves in individual pens and switch to a high quality, powdered milk replacer after 72 hours of age.

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Revised 1992 06 3M